

ABOUT NITTTR, KOLKATA

National Institute of Technical Teachers' Training and Research (NITTTR), Kolkata was born in 1965 as Technical Teachers' Training Institute, Calcutta. It was established by the Department of Education, MHRD, Govt. of India as a fully centrally funded autonomous institution for quality improvement of the technical education system of the country. The Govt. of India, in 2003, accorded national status to this Institute, (along with the 3 sister Institutes) in recognition of the contribution of these Institutes for the expert service rendered for overall improvement of quality of Technical Education System.

The focal activities of the Institute are (i) Education & Short-term Training, (ii) Curriculum Development, (iii) Learning Resources Development, (iv) Research & Development and (v) Extension Services & Consultancy.

The Civil Engineering Department was established in 1965 along with the inception of the Institute and has been playing a key role in transforming the vision of the Institute into reality for the last almost six decades. The department has developed highly equipped laboratories in the areas of Structural Engineering, Concrete Technology, Earthquake, Environmental and Geotechnical Engineering. The department has full-time QIP sponsored PhD Research Scholars and runs a master's degree program in Structural Engineering. The Department has a sophisticated Electro-Dynamic Shake Table capable of simulating different types of ground vibrations to assess their effect on structures.

ABOUT THE SHORT TERM TRAINING PROGRAM

With increase in building height, the lateral stiffness of columns become inadequate and shear walls are almost routinely used in multistoried buildings as they can effectively contribute to the strength, stiffness and ductility of the buildings. Though the shear walls are to be designed as per the principles of Limit State Method, the methodology of design as prescribed in IS:13920-2016 is quite empirical. Only a couple of closed-form expressions are provided in the standard without providing the underlying principles based on which the expressions have been derived. Designers have to adopt these equations almost blindly using known values of axial forces and areas of vertical reinforcement to determine the moment of resistance capacities of slender, rectangular shear walls with uniformly distributed vertical reinforcement without boundary elements. These equations have a number of limitations and cannot predict the moment capacities under all probable conditions. This has been the custom of designing shear walls in India over the last three decades. This lack of understanding of the basic design principles develops a sense of awe amongst the designers as if shear wall design is a complicated and difficult task which is beyond the grasp of the common designers. The main theme of the Course is to break the ice and elucidate the process of shear wall design in a simple and straightforward manner using the fundamental principles of limit state method.

RATIONALE OF THIS PROGRAM

Unlike mathematics or physics which are strictly bound by rigid laws and hypotheses, reinforced concrete design is a philosophy and the same problem can be dealt with by different designers in different ways. Unfortunately, Limit State Method of design is

performed mostly in a mechanical manner using the design aids or tools available, without venturing into the fundamental design philosophy. In the present program Limit state design methodology will be covered in detail following the basic assumptions and specifications outlined in the Codes of practice. Limit State of collapse in flexure and compression will be explained thoroughly before discussing the design methodology of shear walls. Application of a standard software for analysis and design of shear walls will also be covered in the course. Here lies the basic rationale of the course.

OBJECTIVES OF THE PROGRAM

For designing or checking the safety of sections which are simultaneously subjected to flexure and axial forces like columns, both the force and moment equilibrium equations are to be solved. Solution of these equations for all worst load combinations is a herculean task. Hence instead of load-based design capacity based approach is adopted and interaction charts are to be developed for design of such sections. The present Indian Standards do not provide such design aids or tools for design of shear walls. Rather some expressions based on simplifying assumptions which are not fully conforming to the requirements of limit state method of design as per IS:456-2000 are provided. The course will make a humble effort to highlight the shortcomings of the design methodology for shear walls as prescribed by IS:13920-2016. P-M interaction diagram for different grades of structural concrete permitted by IS:456-2000 and four grades of HYSD steel namely Fe415, Fe500, Fe550, Fe600 will be developed conforming to the fundamentals of limit state method of design as per IS:456-2000. In addition, P-M interaction charts

will be prepared conforming to the specifications of IRC:112-2020, which is having similar requirements as per EN 1992-1-1, Euro code:2. The mother code of concrete in India, IS:456-2000 is on the verge of revision whereby significant changes are likely to be introduced. It is most likely that the modified standard will be in line with the RC design provisions of IRC:112-2020. It may be stated that P-M interaction charts, which are more convenient to use than closed form equations, cater not only to the present version of IS:456 but are expected to find useful application for the revised version of the standard also.

PROGRAM OUTLINES

- ▶ Limit State Method as per IS 456-2000 and IRC 112-2020
- ▶ Design in flexure and compression
- ▶ Shortcomings of design of Shear Walls as per IS 13920-2016
- ▶ Methodology of development of Interaction Charts and modified design of shear walls in a manner similar to columns

OUTCOME OF THE PROGRAM

- After attending the programme, the participants will be able to
- Understand the fundamental principles of RC design as per Indian Standards, IS 456-2000 and IRC 112-2020, the fundamentals of Limit State Method and need for ductility design
 - Explain failure modes of shear walls
 - Design shear walls as per IS 13920-2016
 - Develop Interaction Charts for Shear Walls
 - Apply a standard software for analysis and design of shear walls

The main aim of the training program is to equip the participants with the methodology of shear wall design using P-M Interaction Charts similar to columns instead of working with some empirical equations as per IS 13920-2016.

INTENDED PARTICIPANTS

Undergraduate and Postgraduate Students, Research Scholars, Faculty Members from Technical Institutions, Civil and Structural Engineers working in Government and Private Sectors, Design Engineers, and Consultants

COURSE FEE

Students - Rs. 300/=

Faculty Members - Rs. 1500/=

Engineers from the Industry - Rs. 1500/=

Course Fees include Course Materials, Tea and Working Lunch on the days of the Program, Faculty members from Govt organizations will be provided TA, DA as per govt norms. However, other participants need to pay for food and accommodation as per Institute norms. Please visit Institute website for registration.

DATE, TIME & VENUE

The Course will be organized for five (5) days. It will be held from 25th to 29th September 2023 from 10.30 am to 5.30 pm at NITTTR, Kolkata.

COORDINATOR

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Organizes a STTP on

SHEAR WALL DESIGN USING INTERACTION CHARTS HIGHLIGHTING THE SHORTCOMINGS OF IS 13920-2016

(25TH - 29TH SEPTEMBER 2023)



Coordinator
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Venue
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